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Global nutrients data synthesis based on Reference Material of Nutrients of Seawater

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Realistic distributions of nitrate, phosphate and silicate and inventories of them in the world's ocean are basic issues of geochemical study of nitrogen, phosphorous and silicon cycles as well as tracer use of nutrients for deep ocean circulation. WOA09 and WGHC were global hydrographic datasets created by objective analysis and offset correction/objective analysis, respectively. However synthesis using mathematics methods and experience could get apparent global comparability but does not have a firm foundation, therefore accuracy is unknown for nutrients data in WOA05/09 and WGHC. Recently hydrographic dataset such as CARINA and PACIFICA were also created by synthesis. We did global synthesis work based on Reference Material of Nutrients in Seawater (RMNS) for WOCE/CLIVAR cruises datasets, WGHC datasets and some new hydrographic cruises which cover the Pacific Ocean, the Atlantic Ocean, the Indian Ocean, the Southern Ocean and the Arctic Ocean. Among 69982 profiles in 5174 cruises, we could put correction factors of nutrients concentration for 14491 profiles in 268 cruises for nitrate, 18378 profiles in 412 cruises for phosphate and 15825 profiles in 268 cruises for silicate. Global Nutrients Dataset 2010, GND10, is newly created as 0.5 deg. [U+F0B4] 0.5 deg. and 50 m interval of 138 levels gridded dataset based on corrected nutrients profiles described above. One feature of GND10 is that nitrate vs. phosphate ratio in deep waters in WOA dataset showed a peak at 14.6 while nitrate vs. phosphate ratio in GND10 showed a peak at 14.3 and kurtosis of frequency distribution of nitrate vs. phosphate ratio is larger in GND10 dataset rather than that in WOA dataset. A reason of larger kurtosis of distribution of nitrate vs. phosphate ratio might be that comparability of nitrate and phosphate concentration data was improved. Newly created GND10 can provide more realistic distribution of nutrients in the world ocean because comparability of nutrients concentration in GND10 is improved based on RMNS. The GND10 would be useful to study changes in the distribution of concentrations of nutrients in the world ocean and also useful as new initial conditions for modelers who studies global changes. Carbonate system data and oxygen data will be merged with factor corrected nutrients data to study coupling of carbonate system and nutrients cycles, too.